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ABSTRACT

This report provides annual average estimates for the number of workers who will be required through the mid-1970's to meet manpower requirements in most of the occupations for which vocational education curriculums have been developed. The estimates are for technical, health, trades and industrial, office, and distributive occupations. The average annual openings are based upon growth in each occupation and replacement of workers who die or withdraw from the labor force. No comprehensive data have yet been developed to include data on vocational education programs, Manpower Development and Training Act Programs, on-the-job training, technical institutions, and apprenticeships. However, Table 2 gives demand and supply data for a selected group of occupations to determine whether training programs are meeting the manpower requirements. (BC)

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MANPOWER REQUIREMENTS IN OCCUPATIONS FOR WHICH VOCATIONAL EDUCATION PREPARES WORKERS

This report summarizes estimates of the number of workers who will be needed each year through the mid-1970's to meet manpower requirements in a large number of occupations for which vocational education curricula have been developed.

The estimates may be used for several purposes. They can be helpful in evaluating, at a national level, the adequacy of present vocational education programs in meeting total manpower needs in these occupations. These estimates also can point out the gaps in occupational coverage of present research on national manpower requirements.

The occupations included are drawn from a more comprehensive list of 240 occupations for which estimates of annual manpower demand have been prepared by the Bureau of Labor Statistics, in connection with the occupational outlook research program. Together, these 240 occupations account for more than half of all employment in the United States. Coverage of the occupations requiring long periods of education or training, including professional and technical occupations, skilled crafts, service occupations, clerical occupations, and sales occupations is especially extensive.

The occupations for which projections have been made were keyed to the U.S. Office of Education listing of instructional programs in vocational and technical education. In relating occupations to instructional program categories, the Bureau of Labor Statistics used the forthcoming publication of the Office of Education "Vocational Education and Occupations", which was prepared cooperatively by the Office of Education and the Manpower Administration of the Department of Labor. The occupations for which estimates of annual average demand have been prepared include those employing 96 percent of the workers in occupations for which vocational education instructional programs in Technical Occupations prepare workers, 93 percent in Health Occupations, 82 percent in Trades and Industrial Occupations, 73 in Office Occupations, and 22 percent in Distributive Occupations. The estimates of employment for 1966 in occupations not yet covered in the occupational outlook research program are very preliminary and should be used only to indicate rough orders of magnitude.

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The estimates were prepared as an outgrowth of a major research program on manpower requirements by the Bureau of Labor Statistics. This program has as one of its products the Occupational Outlook Handbook, which provides information on occupational employment opportunities, the nature of the work, the training required, and other information for use in vocational guidance. The research underlying this publication includes inputs from several units of the Bureau of Labor Statistics. The following projections to 1975 have been made: labor force by age and sex; growth and changing character of the economy; gross national product and national income and its distribution; the demand for each type of product or service, and production requirements in each industry generated by this demand; employment resulting from these levels of production; occupational composition of industries representing the entire economy; changing trends in occupational requirements within each industry resulting from technological change; and job openings resulting from losses in each occupation because of retirements and deaths. These estimates are embodied in the projections of demand in the 240 occupations. Work is now being done on the projections for the year 1980.

Interpretation of the results for evaluation of vocational education and training programs requires that certain points be considered:

1. The estimates of annual average openings include the openings resulting from growth in each occupation and from the replacement of workers who die or withdraw from the labor force, but they do not include the workers who leave the occupation for other occupations or allow for those workers who enter the occupation from other occupations--i.e., they do not include net occupational mobility. This area needs additional research.

2. In evaluating the average annual openings in comparison with the number of persons being trained by vocational education curricula two special considerations apply: (a) the vocational education curricula are not the only way workers are trained in various occupations. Workers are trained by apprenticeship, in MDTA programs, by other formal or informal on-the-job programs, in proprietary vocational schools, in the military service or in technical institutes, and some workers pick up the skills on the job or by home study. To evaluate whether an expansion of training is needed the total inputs into each occupation from all these sources should be considered. No one authority yet has collected systematically information either nationally or locally on all of the training programs preparing workers for each occupation. This work needs to be done to evaluate needs for expansion in training programs to meet manpower requirements. (b) The number of workers completing vocational education of other types of training may exceed the number actually entering the occupation, because a slippage between completion of the course and employment usually occurs. This factor should be evaluated also in comparing the training activity with manpower needs. Surveys of a sample of graduates of various courses should be made to determine the extent of this slippage.

Systematically bringing together data on the demand and supply of workers by occupation on both a national and local basis is a major undertaking. However, the attached table 2 illustrates how demand and supply data for a selected group of occupations can be evaluated in terms of what training programs need to be increased and the magnitude of the increase necessary to meet requirements. Programs for dental assisting, for example, would need to be increased more than three-fold to meet annual openings. On the other hand, dental hygiene program completions approach annual openings; thus, training authorities should allocate priority to programs where completions fall far short of annual job openings.

Table 1. Estimated 1966 Employment in Occupations for which Vocational Education Instructional Programs Provide Preparation, and Estimated Average Annual Openings, 1966-75 for those Occupations covered by the Occupational Outlook Handbook Research Program

Office of Education Instructional Program Code	Title	Employment, 1966	Average Annual Openings, 1966-75
7.000	HEALTH OCCUPATIONS, TOTAL	2,020,900	
	Covered in Occupational Outlook Program	1,882,000 (93%)	203,400
7.0101	Dental assisting	93,000	7,700
7.0102	Dental hygiene	15,000	2,000
7.0103	Dental laboratory technology	25,000	1,700
7.0203, .0204	Medical laboratory assisting, hematology	50,000	8,400
7.0301	Nursing (associate degree)	620,000	61,000
7.0302	Practical (vocational) nursihg	300,000	39,000
7.0303, .0304	Nursing assistance (aide), psychiatric aide	700,000	77,000
7.0501, .0502 .0503	Radiologic technology (X-ray) Radiation therapy, nuclear medical technology	72,000	6,300
7.0601	Ophthalmic dispensing (contact-lens technician; optician, dispensing; artificial-plastic-eye maker; mounter and repairer)	7,000	300
	Not Yet Covered in Occupational Outlook Program	138,900	
7.0201	Cytology (cytotechnology)	1,600	
7.0202	Histology	3,900	
7.0305, .0306	Surgical technician (operating room technician), obstetrical technician	20,000	
7.0307	Home health aide	20,000	
7.0401	Occupational therapy	4,500	
7.0402	Physical therapy	6,000	
7.0403, .0404	Prosthetics, orthotics	3,400	
7.0602	Orthoptics	400	
7.0603	Optometrist assistant	6,500	
7.0701, .0702 .0703	Environmental health assistant, radiologic health technician, sanitarian assistant	5,500	

Office of Education Instructional Program Code	Title	Employment, 1966	Annual Average Openings, 1966-75
7.0901	Electroencephalography technician	1,600	
7.0902	Electrocardiograph technician	5,500	
7.0903	Inhalation therapy	6,000	
7.0904	Medical assistant (assistant in physician's office)	26,000	
7.0905	Central supply technician	11,000	
7.0907	Medical emergency technician, (first-aid attendant, ambulance attendant, emergency entrance attendant)	8,000	
7.0908	Food service supervisor	6,000	
7.0909	Mortuary science (mortician investigator, embalmer)	3,000	
	TECHNICAL OCCUPATIONS, TOTAL	2,239,100	
	Covered in Occupational Outlook Program	2,134,000 (95%)	187,300
16.01	Engineering related technology (engineering and science technicians, draftsmen, surveyors)	885,000	72,000
16.0301	Dental hygiene	15,000	2,000
16.0303	Medical laboratory assisting	50,000	8,400
16.0304	Radiological technology	72,000	6,300
16.0305	Nursing (associate degree)	620,000	61,000
16.0401	Computer programer	100,000	13,600
16.0601	Commercial pilot training	80,000	7,200
16.0603	Forestry technology (forestry aides)	12,000	800
16.0605	Police, law enforcement and correction science technology	300,000	16,000
	Not Yet Covered in Occupational Outlook Program	105,100	
16.0302	Electroencephalograph technician	1,600	
16.0501	Child care center assistant	3,500	
16.0504	Food service supervisor (caterer; director, school lunch program; kitchen supervisor; cook; etc.)	100,000	
	DISTRIBUTIVE OCCUPATIONS, TOTAL	11,902,000	
	Covered in Occupational Outlook Program	2,602,000 (22%)	159,100
04.01	Advertising services* (marketing research worker, advertising workers, public relations workers)	158,000	11,000
04.03	Automotive* (automobile salesmen, automobile service advisor, automobile parts counterman)	218,000	7,500
04.04	Finance and credit* (bank teller, securities salesman)	280,000	25,000

Office of Education Instructional Program Code	Title	Employment, 1966	Annual Average Openings, 1966-75
04.06	Food distribution* (routeman)	255,000	10,000
04.07	Food service* (waiter, waitress)	43,000	2,800
04.08	General merchandise* (cashier)	43,000	3,600
04.10	Hotel and lodging* (hotel manager and motel manager, front office clerk, housekeeper, bellman, bell captain)	280,000	18,000
04.13	Insurance* (insurance agents and brokers)	400,000	43,000
04.16	Petroleum* (gasoline service station attendant)	360,000	9,000
04.17	Real estate* (real estate salesmen and brokers)	215,000	16,000
04.19	Transportation* (airline stewardesses, intercity busdrivers, local transit busdrivers, taxi drivers)	200,000	5,000
04.99	Distributive education, others* (purchasing agents)	150,000	8,200
	Not Covered in Occupational Outlook Program	9,300,000	
04.01	Advertising services* (display manager, time and space buyer, dealer-contact man, public program supervisor, sales-service man, counter clerk, leaseman, trading stamp salesman, billposter, sample distributor, decorator, hand sign writer)	38,000	
04.02	Apparel and accessories* (fashion coordinator, sample girl, footwear salesman, men's and boy's clothing salesman, furs salesperson, jewelry salesperson, leather goods salesman)	474,000	
04.03	Automotive* (spare-parts field representative, parts manager, service manager, vehicle leasing and rental manager, house trailors salesman, service representative, automobile appraiser, parking-lot attendant)	251,000	
04.04	Finance and credit* (broker and market operator, broker's floor representative, credit and collection manager, bank cashier, loan officer, securities trader, reserve officer, bank messenger, credit analyst, brokerage clerk)	228,000	

Office of Education Instructional Program Code	Title	Employment, 1966	Annual Average Openings, 1966-75
04.05	Floristry* (floral designer, flowers salesperson, florist supplies salesman)	47,000	
04.06	Food distribution* (livestock commission man, commissary man, doughnut shop manager, courtesy booth cashier, journeyman groceryman, supermarket department head, bagger, bakery girl)	966,000	
04.07	Food service*	548,000	
04.08	General merchandise* (buyer, store manager, collector, adjustment clerk, new account clerk, comparison shopper, auctioneer, yard goods salesperson, bridal consultant, demonstrator)	3,029,000	
04.09	Hardware, building materials, farm and garden supplies, and equipment* (hardware supplies salesman, construction machinery salesman, dairy supplies salesman, yardman, poultry equipment and supplies salesman, tractor and farm implements salesman)	259,000	
04.10	Home furnishings* (second hand furniture dealer, furniture appraiser, floor coverings estimator, home furnishings salesman, household equipment salesman, furniture inspector)	205,000	
04.11	Hotel and lodging* (traveling manager, convention manager, travel clerk, boarding house manager, doorman, checkroom attendant, room service clerk)	110,000	
04.12	Industrial marketing* (sales manager, sales correspondent, technical service manager, medical equipment and supplies salesman, precision instruments salesman, office machines salesman)	1,235.000	
04.13	Insurance* (special agent, insurance examiner, estate planner, investigator, placer, claim examiner, insurance manager)	127,000	
04.14	International trade* (foreign buyer, export manager, import-export agent, customs-house broker)	70,000	

Office of Education Instructional Program Code	Title	Employment, 1966	Average Annual Openings, 1966-75
04.15	Personal services* (street photographer, funeral director, barber shop manager, beauty shop manager, cemetery manager, laundry superintendent	115,000	
04.16	Petroleum* (bulk plant manager, field representative, oil dispatcher, oil field supplies and equipment salesman)	60,000	
04.17	Real Estate* (property rental agent, apartment house manager, housing project manager, building representative, right-of-way agent, building consultant, real estate appraiser)	127,000	
04.18	Recreation and tourism* (tourist director, theatre manager, booking agent, business agent, ticket seller, travel counselor, sporting goods salesperson, novelties salesman, recreation director)	155,000	
04.19	Transportation* (transportation director, operations manager, airport superintendent, cold storage superintendent, aircraft salesman, pullman porter, reservation clerk, schedule analyst, marine supplies salesman, costing and moving estimator)	984,000	
04.20	Retail trade, other* (house-to-house salesman, solicitor, sales closer, store laborer)	156,000	
04.31	Wholesale trade, other* (distribution warehouse manager, wholesaler, dress trimmings salesman, fuel salesman, general merchandise salesman)	98,000	
04.99	Distributive education, other* (sales development clerk, pest control service salesman, protective service salesman, public utilities salesman, soft water service salesman)	18,000	

Office of Education Instructional Program Code	Title	Employment, 1966	Average Annual Openings, 1966-75
14.00	OFFICE OCCUPATIONS, TOTAL	9,953,000	
	Covered in Occupational Outlook Program	7,180,000 (72%)	555,000
14.0102	Bookkeepers	1,180,000	80,000
14.0103	Cashiers	700,000	60,000
14.0104 .0301 .0404	Machine operators (billing machine operator, calculating machine operator, duplicating machine operator, addressing machine operator)	400,000	43,000
14.0105	Tellers	180,000	17,000
14.02, .0201 .0202 .020201	Business data processing occupations (computer operator, key-punch operator)	120,000	14,000
14.0203	Programers	100,000	13,600
14.0204	Systems analysts	60,000	11,800
14.0401	Communications systems clerks and operators (central-office operator, telephone operator)	400,000	28,000
14.0403	Mail and postal clerks*	280,000	11,500
14.0405	Receptionists and information clerks	220,000	25,000
14.0503	Shipping and receiving clerks	325,000	10,500
14.06	Personnel, training, and related occupations* (manager-personnel, personnel clerk, job analyst, employment interviewer, salary and wage administrator)	100,000	6,200
14.07	Stenographic secretarial and related occupations	2,400,000	175,000
14.09	Typing and related occupations	715,000	60,000
	Not Yet Covered in Occupational Outlook Program	2,773,000	
14.0101	Accountants	50,000	
14.0199	Accountant and computing occupations, other	15,000	
14.0302	File clerks	175,000	
14.0303	General office clerks	900,000	
14.0399	Filing, office machines, and general office clerical, other	400,000	
14.0402	Correspondence clerks	30,000	
14.0403	Mail and postal clerks*	140,000	
14.0405	Messengers and office boys & girls	75,000	
14.0499	Information communication occupations, other	175,000	
14.0501	Planning and production clerks	115,000	
14.0502	Quality control clerks	4,000	

Office of Education Instructional Program Code	Title	Employment, 1966	Average Annual Openings, 1966-75
14.0504	Stock and inventory clerks	90,000	
14.0505	Traffic rate and transportation clerks	45,000	
14.0599	Material support occupations, other	35,000	
14.06	Personnel, training, and related occupations*	40,000	
14.0801	Administrative assistants	85,000	
14.0802	Budget management analysts	60,000	
14.0804	Data-methods and systems procedures analysts	4,000	
14.0805	Office managers and chief clerks	100,000	
14.0899	Supervisory and administrative management occupations, other	100,000	
14.99	Office occupations, other	135,000	
	TRADES AND INDUSTRIAL OCCUPATIONS, TOTAL	14,283,700	
	Covered in Occupational Outlook Program	11,588,200 (81%)	577,500
17.01	Air conditioning, cooling, heating, and ventilating occupations	80,000	3,500
17.02	Appliance repair	195,000	10,000
17.0301	Automotive body and fender	95,000	3,700
17.0302, .0303	Automobile mechanics	580,000	20,000
17.0401	Aircraft maintenance	130,000	6,500
17.0402	Aircraft operations (flight engineer)	7,200	500
17.0403	Ground operations (air-traffic controller)	14,000	400
17.06	Business machine maintenance	80,000	3,700
17.07	Commercial art occupations	60,000	2,200
17.0701, .0702	Interior decorating and window display	15,000	700
17.0703	Product design occupations	10,000	400
17.0801, .0802	Seamanship, ship and boat operation and maintenance (seamen, engineer, marine oiler)	100,000	2,000
17.0901	Photographic laboratory and darkroom occupations	30,000	1,300
17.1001	Carpentry	850,000	32,000
17.1002	Electricity	175,000	6,400
17.100302	Operation, heavy equipment	275,000	16,000
17.1004	Masonry	260,000	10,600
17.1005	Painting and decorating	460,000	19,000
17.1006	Plastering	80,000	3,300

Office of Education Instructional Program Code	Title	Employment, 1966	Average Annual Openings, 1966-75
17.1007	Plumbing and pipefitting	350,000	16,000
17.1009	Glazing	6,000	400
17.1010	Roofing	60,000	2,100
17.1099	Construction and maintenance trades, other* (millwright, structural-steel worker, boilermaker, elevator constructor, cement mason, floor layer)	300,000	15,000
17.11	Custodial services	1,000,000	80,000
17.12	Diesel mechanic	76,000	4,000
17.13	Drafting	270,000	16,000
17.14	Electrical occupations	240,000	7,500
17.1402	Linemen*	35,000	1,100
17.1501	Communications (central office repairmen-installer, PBX repairmen)	209,000	9,000
17.19	Graphic arts occupations	310,000	8,000
17.21, .2101	Instruments maintenance and repair*	80,000	4,500
17.2102	Watchmaking and repair*	25,000	700
17.2301	Foundry and related work* (coremaker, molder)	75,000	1,400
17.2302, .2303	Machine shop	900,000	27,000
17.2305	Sheet metal*	55,000	2,100
17.2306	Welding and cutting	460,000	23,000
17.2307	Tool and die making	150,000	6,300
17.2309	Metal patternmaking	20,000	400
17.2399	Metalworking, other* (blacksmith)	15,000	600
17.2601	Barbering	205,000	12,000
17.2602	Cosmetology	450,000	43,000
17.2801	Fire training	183,000	10,000
17.2904	Waiter/waitress	970,000	64,000
17.32	Stationary energy sources occupations (stationary engineer, firemen)	305,000	9,000
17.3203	Pumping plants* (sewage plant operator)	23,000	1,500
17.3402	Shoe repair	30,000	1,200
17.35	Upholstering* (automobile upholsterer, furniture upholsterer)	40,000	1,000
	Not Yet Covered in Occupational Outlook Program	2,695,500	
17.08	Commercial fishing occupations	60,000	
17.10	Construction and maintenance trades	185,000	
17.100301	Maintenance, heavy equipment	50,000	
17.1008	Dry wall installation	15,000	

Office of Education Instructional Program Code	Title	Employment, 1966	Average Annual Openings, 1966-75
17.1099	Construction and maintenance trades, other*	20,000	
17.1401	Industrial electrician	25,000	
17.1402	Linemen*	17,500	
17.1502	Industrial electronics	15,000	
17.16	Fabric maintenance service	200,000	
17.20	Industiral atomic energy	20,000	
17.21, .2101	Instruments maintenance and repair*	20,000	
17.2102	Watchmaking and repair*	20,000	
17.22	Maritime occupations	17,000	
17.2301	Foundry and related work*	75,000	
17.2304	Metal trades, combined	265,000	
17.2305	Sheet metal*	6,000	
17.2308	Die sinking	6,000	
17.2399	Metalworking, other*	135,000	
17.24	Metallurgy	40,000	
17.27	Plastics occupations	75,000	
17.2899	Public service occupations, other	20,000	
17.29, .2999	Quality food occupations	15,000	
17.30	Refrigeration	2,000	
17.31	Small engine repair		
17.3201	Electric power generating plants	25,000	
17.3202	Pumping plants*	35,000	
17.33	Textile production and fabrication	900,000	
17.34	Leatherworking	60,000	
17.3401	Shoe manufacturing	150,000	
17.35	Upholstering	20,000	
17.3601	Millwork and cabinet making	150,000	
17.3699	Woodworking, other	50,000	

* Part of this group, represented by the employment total shown, is covered by the estimates of annual average openings; the remainder is shown among the instructional programs not covered in the occupational outlook program, with the estimated employment.

Table 2. Comparison of Academic Completions from Known Sources of Academic Training, 1966, With Average Annual Openings, 1966-75, for Selected Health Occupations Classified by Vocational Education Training Programs

Office of Education Instructional Program 1/ Code	Title	Average Annual Openings, 1966-1975	Known Academic Completions 1966-67	
			Total	Vocational Education post-secondary programs
7.0101	Dental assisting	7,700	2,200	903
7.0102	Dental hygiene	2,000	1,800	452
7.0103	Dental laboratory technology	1,700	250	189
7.0203, .0204	Medical laboratory assisting, hematology	8,400	1,800	749
7.0301	Nursing (associate degree)	61,000	38,237 1/	2,056
7.0302	Practical (vocational) nursing	39,000	27,644	16,420
7.0501, .0502 .0503	Radiologic technology (X-ray, radiation therapy, nuclear medical technology)	6,300	3,827	383

1/ Includes graduates from diploma programs (27,452), baccalaureate degree programs (6,131), and associate degree programs (4,654).